Pre-launch calibration of Spectral Profiler (SP) / LISM on SELENE mission

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We present our pre-launch calibration results and plans of in-flight calibration of Spectral Profiler (SP) onboard SELENE spacecraft launching off to the Moon next summer.

SP is a visible and near infrared spectrometer, consisting an optical instrumental suite: Lunar Imager / Spectrometer (LISM), which aims to collect global compositional and topological information of the lunar surface by optical remote sensing. SP covers 0.5-2.6 micro-m of wavelength with spectral resolution of 6-8nm. Most of the absorption bands of the minerals expected on the lunar surface, such as pyroxene, olivine, and plagioclase, locate within in this range. Although these spectral signatures are usually weak, SP can detect them due to its extremely high signal-to-noise ratio. SP clarifies the mineralogical compositions of the lunar surface and, in collaboration with Multi-band Imager (MI), (which is another component of LISM,) contributes to the completion of the global map of the mineral distribution on the Moon.

We show the results of pre-launch calibration of SP based on the data acquired under the various environments, focusing on the preliminary examinations and the thermal vacuum tests conducted at JAXA during December 2006 - January 2007.

We first show the radiometric calibration results. Based on the data for the case where the integrated sphere is used as a light source, we reveal the calibration coefficients to relate recorded digital number to spectral. Second, we propose our dark output model. The temperature of the detectors, those of SP body and other minor factors such as input voltage are the potential variables to explain dark outputs of each pixel. Each element has different sensitivities in relation to these factors. We exhibit the evaluation of them in total and estimate the dark output under various conditions. We summarize the pre-launch calibration results of SP and discuss its expected performance, and lastly, we introduce the strategies for in-flight calibrations. We also mark the potential targets for SP observation in detail, referring to each scientific objective, and discuss what are the challenges for SP.